Cenozoic Mississippi Fan Fold Belt (UPL-LL X2) Play

Globorotalia uncinata* through *Sangamon Fauna

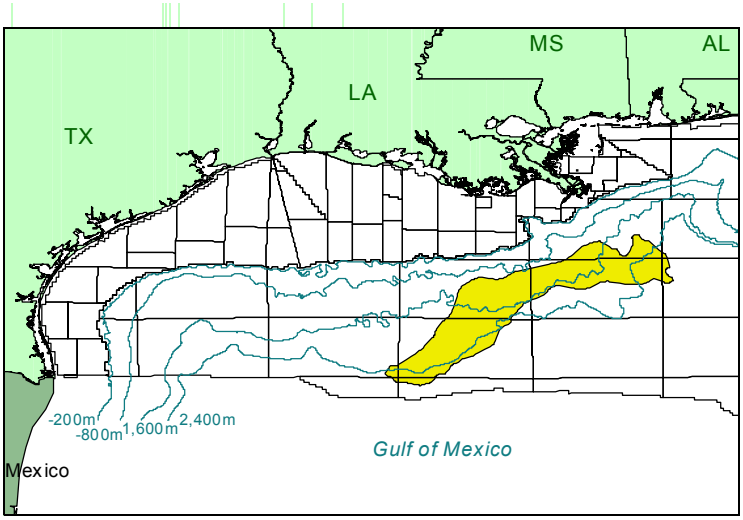

Figure 1. Play location.

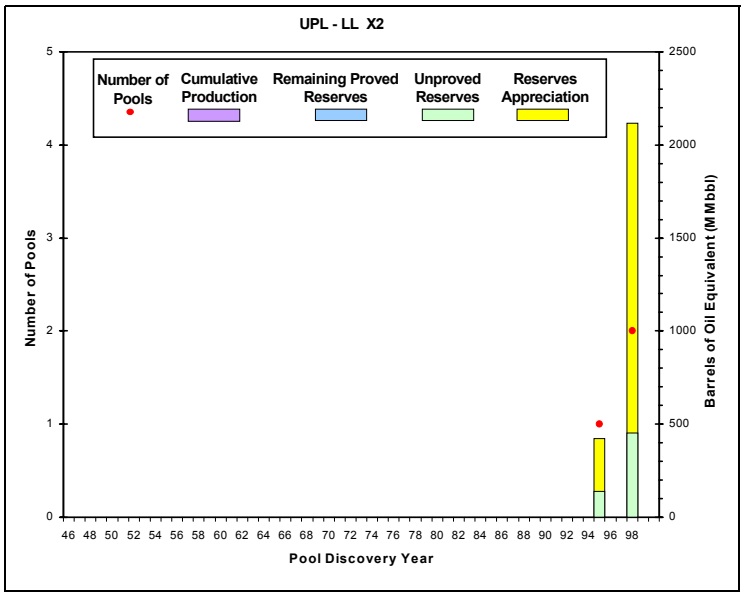

Figure 2. Exploration history graph showing reserves addition and number of pool discoveries by year.

UPL-LL X2 Cenozoic Miss. Fan Fold Belt 3 Pools 10 Sands	Minimum	Mean	Maximum
Water depth (feet)	6133	6201	6560
Subsea depth (feet)	12906	16538	20421
Number of sands per pool	1	1	2
Porosity	25%	28%	30%
Water saturation	16%	24%	48%

Table 1. Pool attributes. Values are volume-weighted averages of individual reservoir attributes.

Play Description

The established Cenozoic Mississippi Fan Fold Belt (UPL-LL X2) play is defined by Cenozoic deep-sea fan deposition and a series of east-northeast trending salt-cored folds. The play is one of the largest in the Gulf of Mexico Region and contains some of the largest discoveries made in the Region to date. The following discussion is from Post (2000), unless otherwise noted.

The UPL-LL X2 play extends from the Walker Ridge Area to the Mississippi Canyon Area (figure 1). Landward, the fold belt extends under the Sigsbee Salt Canopy where the most basinward, counter-regional fault/salt weld related to salt canopy development is used as a geologically reasonable updip limit for the play. To the northeast, the play boundary is difficult to define because of structural overprinting. Regional analysis suggests that it may be coincident with the Pearl River Transfer. The southwestern play boundary may occur at either another transfer zone or by a transition into the Perdido Fold Belt. Because the boundary lies beneath the Salt Canopy, the connection and relationship between the two fold belts remains speculative.

Although fold belt structures generally extend basinward to the depositional limit of underlying Louann Salt, there are indications in the northeastern part of the area that folding may extend beyond this limit. Continued updip extension during the Pliocene to Recent caused downdip compression regardless of whether the salt décollement is present. Exhausting the supply of mobile salt shifts the detachment to an incompetent unit above the salt, probably a shale unit.

Play Characteristics

The Mississippi Fan Fold Belt

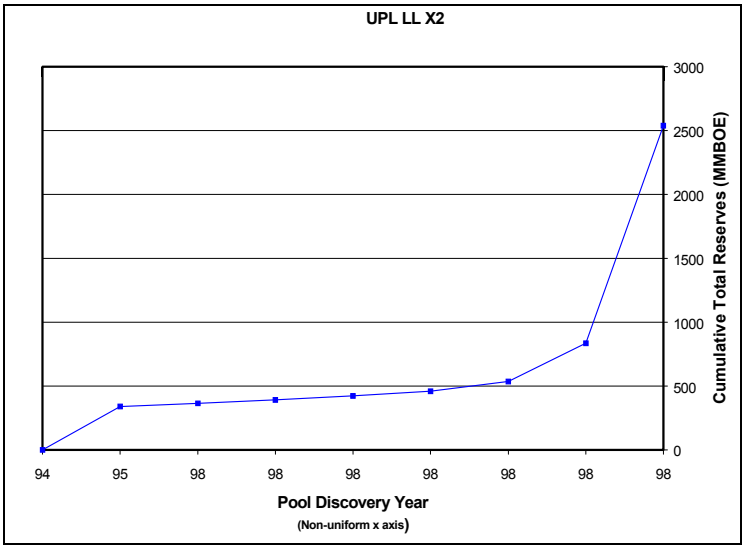

Figure 3. Plot of pools showing cumulative reserves by discovery order. In this figure, sands have been elevated to pool status. Note the non-uniform x axis.

UPL-LL X2 Cenozoic Miss. Fan Fold Belt Marginal Probability = 1.00	Number of Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Reserves				
Original proved	0	0.000	0.000	0.000
Cumulative production	--	0.000	0.000	0.000
Remaining proved	--	0.000	0.000	0.000
Unproved	3	0.301	1.629	0.591
Appreciation (P & U)	--	0.951	5.600	1.947
Undiscovered Conventionally Recoverable Resources				
95th percentile	--	3.675	9.647	5.528
Mean	82	4.363	11.628	6.432
5th percentile	--	5.183	13.876	7.462
Total Endowment				
95th percentile	--	4.927	16.875	8.066
Mean	85	5.615	18.856	8.970
5th percentile	--	6.435	21.104	10.000

Table 2. Assessment results for reserves, undiscovered conventionally recoverable resources, and total endowment.

is located at the basinward limit of a balanced and linked, complex system in which updip sedimentary loading and gravity-driven collapse associated with extension are accommodated by the extrusion of salt canopies and downdip contraction. Although thinning of the Late Jurassic–Cretaceous seismic is seen on some seismic lines through the MFFB, this is interpreted to indicate a local, early structural growth stage contemporaneous with deposition of this section (Rowan *et al.,* 2000). A regional early stage of fold development occurred during the Late Oligocene to Middle Miocene; however, timing of the main folding and thrusting event for UPL-LL X2 is related to the development of the thick Middle to Late Miocene siliciclastic depocenters in southeast Louisiana. Fold growth continued with minor thrusting during the Late Miocene through the Pleistocene. Folds in the play consist of a series of east - northeast - south-southwest trending, subparallel, salt-cored folds. The folds are asymmetric, basinward-vergent, with landward-dipping, typically listric reverse faults that cut the basinward limb of the fold.

Discoveries

The UPL-LL X2 play is a mixed oil and gas play, with total reserves of 1.252 Bbo and 7.228 Tcfg (2.538 BBOE), none of which has been produced. The play consists of 10 sands in three pools (table 1; refer to the Methodology section for a discussion of reservoirs, sands, and pools). The first UPL-LL X2 reserves were discovered in 1995 in the Atwater 575 field (Neptune-AT, 422 MMBOE in total reserves) (figure 2); however, the largest pool in the play is the Green Canyon 826 field (Mad Dog) discovered in 1998 with 1,702 MMBOE in total reserves. The third pool in the play, also discovered in 1998, is Green Canyon 699 field (Atlantis, 412 MMBOE in total reserves). The average size of the three discovered pools is 846 MMBOE in total reserves. These

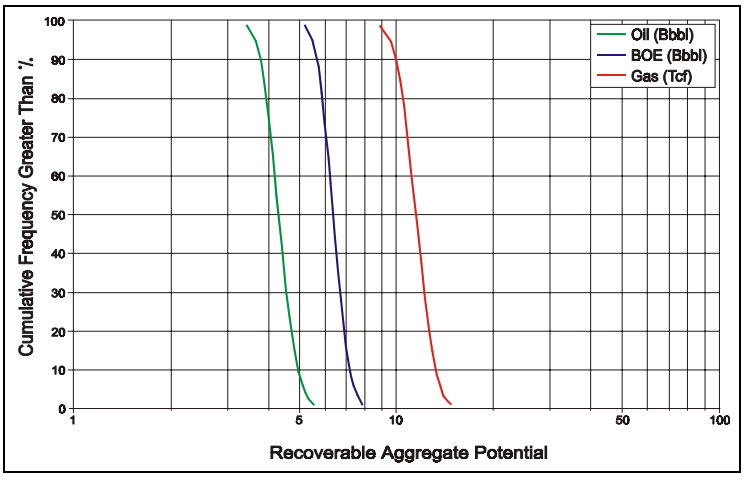

Figure 4. Cumulative probability distribution for undiscovered conventionally recoverable resources.

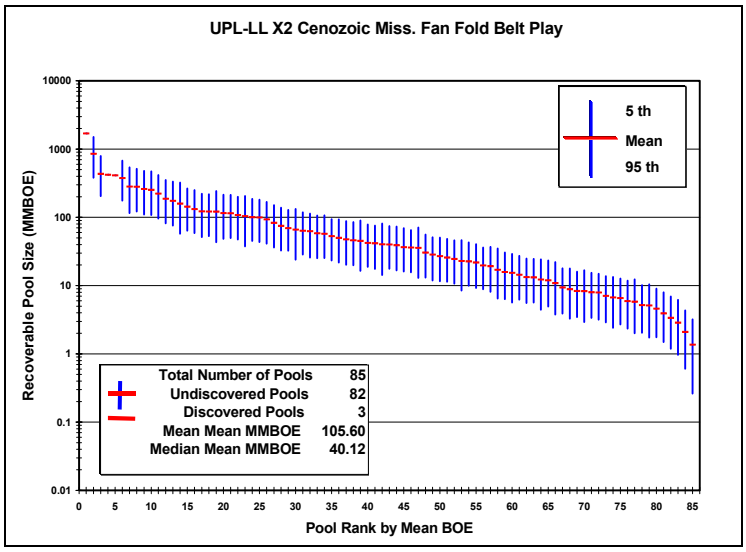

Figure 5. Pool rank plot showing the number of discovered pools (red lines) and the number of pools forecast as remaining to be discovered (blue bars).

three discoveries were made prior to this study's cutoff date of January 1, 1999.

The three discovered pools contain 10 reservoirs, of which seven are nonassociated gas and three are undersaturated oil.

Assessment Results

The marginal probability of hydrocarbons for the UPL-LL X2 play is 1.00. The play contains a mean total endowment of 5.615 Bbo and 18.856 Tcfg (8.970 BBOE) (table 2).

Assessment results indicate that undiscovered conventionally recoverable resources (UCRR) have a range of 3.675 to 5.183 Bbo and 9.647 to 13.876 Tcfg at the 95th and 5th percentiles, respectively (figure 3). Mean UCRR are estimated at 4.363 Bbo and 11.628 Tcfg (6.432 BBOE). These undiscovered resources might occur in as many as 82 pools. The largest undiscovered pool has a mean size of 856 MMBOE in forecast total reserves (figure 4). The next four largest undiscovered pools occupy positions 3, 6, 7, and 8 on the pool rank plot. The mean mean size of the five largest undiscovered pools is 442 MMBOE and the mean mean size of all pools, including discovered and undiscovered, is 106 MMBOE.

Exploration Future

The UPL-LL X2 play has potential for numerous significant discoveries. The play ranks as largest in the Gulf of Mexico Region on the basis of both BOE mean total endowment and BOE mean UCRR. The play accounts for nearly 7 percent of the BOE mean total endowment and 9 percent of the BOE mean UCRR for the entire Gulf of Mexico Region. BOE mean UCRR contribute 72 percent to the play's mean total endowment.

Discoveries made to date occur immediately in front of and extend a short distance under the

Sigsbee Salt Canopy. The large, untested area of this play that lies totally beneath the salt canopy has stratigraphy similar to that of the tested area immediately adjacent to the front of the salt canopy, with traps and migration pathways possibly related to canopy emplacement. Thus far, hydrocarbons have been found in lower and middle Miocene rocks.

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